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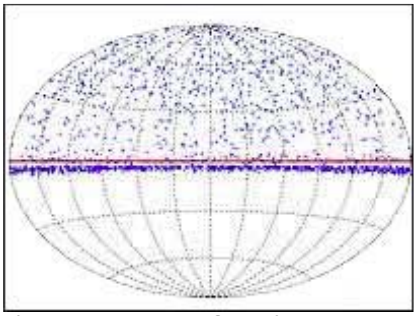
Icebound telescope probes the Universe

By Dr David Whitehouse
BBC News Online science editor

The first ever map of the neutrino sky has been produced by a novel telescope encased in ice at the South Pole.


The neutrinos come from deep space

From beneath the Antarctic ice, astronomers have been able to detect neutrinos - particles that trace the most violent events in the cosmos, many of them yet to be explained.

Sensors in the ice have detected the rare and fleeting flashes of light caused when neutrinos interact with the ice.

Researchers say it is just the beginning in the opening of a new window on the Universe. Past experience has shown that when new technologies like this are developed, many surprises emerge.

Looking down

Amanda 2 (Antarctic Muon and Neutrino Detector Array - 2) is designed to look not up, but down, through the Earth to the sky of the Northern Hemisphere.


Amanda at the South Pole

It comprises 677 glass optical modules, each the size of a bowling ball, arrayed on 19 cables set deep in the ice forming a cylinder 500 metres in height and 120 metres in diameter.

The glass modules detect streaks of light created as neutrinos collide with atoms in the ice.

The map it has produced has been unveiled at a meeting of the International Astronomical Union (IAU) in Sydney, Australia. It provides astronomers with their first tantalizing glimpse of very high-energy neutrinos.

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Elusive, ghostly

Neutrinos are particles that, despite being abundant in the cosmos, are difficult to detect. They are believed to come from some of the most violent events in the Universe - colliding black holes, gamma ray bursts from exploding stars, and violent events at the cores of distant galaxies.

"This is the first data with a neutrino telescope with realistic discovery potential," says Francis Halzen of the University of Wisconsin-Madison, US.


The detectors are encased in ice

The neutrino map comes from only one year of data gathered by the icebound telescope.

Incorporating the two more years of data already harvested by Amanda 2 will enable researchers to go into further details.

In the sky map, Amanda 2 has detected neutrinos that have up to one hundred times the energy of neutrinos generated by the most powerful earthbound particle accelerators. This raises the hope that some of them may reveal the most energetic events in the cosmos.

In the future, the hunt for the sources of cosmic neutrinos will get a boost as Amanda 2 grows in size as new strings of detectors are added. Current plans are for the detector to grow to a cubic kilometre of instrumented ice that will be known as IceCube.

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